

CRUSADER

The Army XXI Firepower Revolution

Presented to:

Future Combat System M&S Working Session

Presented by:

**Wes Beal
OPM Crusader,
Systems Engineering**

For Additional Information

phone: (973) 724-7655

fax: (973) 724-2221

e-mail: wbeal@pica.army.mil

web pages: <http://www.pica.army.mil/orgs/crusader>

<http://www.teamcrusader.com>

7 March 2000

Crusader - A System for the 21st Century



Lethal Firepower

- Cooled Cannon for Continuous Fires
- 10-12 Rnds/minute out to 40-50 km
- Enhanced Accuracy with Projectile Tracking

XM2001

System



Crew Cockpit Enables Information Dominated Warfare

- Mission Planning
- Situational Awareness
- Decision Aids

RSV-T

XM2002

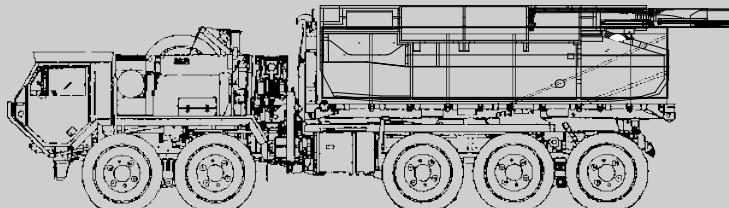
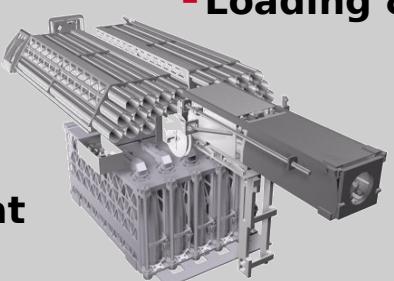


Fully Automated

- Resupply
- Ammunition Handling
- Aiming
- Loading & Firing

RSV-W

XMXXXX



Highly Mobile

- 1500 HP to Meet & Exceed M1/M2
- First Drive-by-Wire Ground Combat Vehicle
- Ride Quality Better than M1/M2

Unmatched Survivability

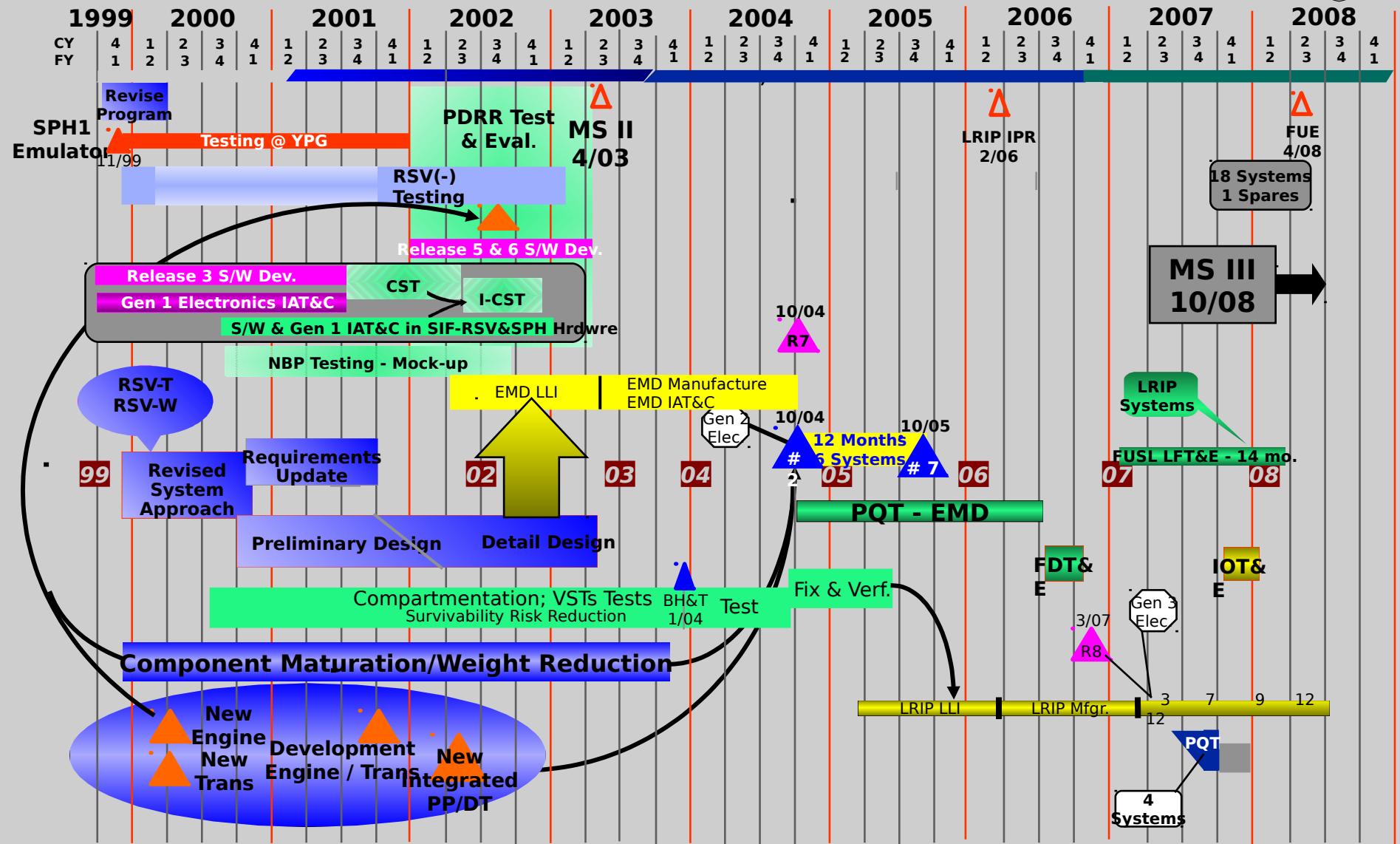
- Separate Crew & Weapon Stations
- Composite Armor
- Ballistic & Non-ballistic

Track / Wheeled RSV

- Greater O & O Flexibility
- Match Systems to Intensity



Crusader Path Forward - Revised Concept



Integrated Data Environment Lessons Learned

Objective

- ❖ Link all Team Crusader players to facilitate total system process



Internet Connection, not all locations listed

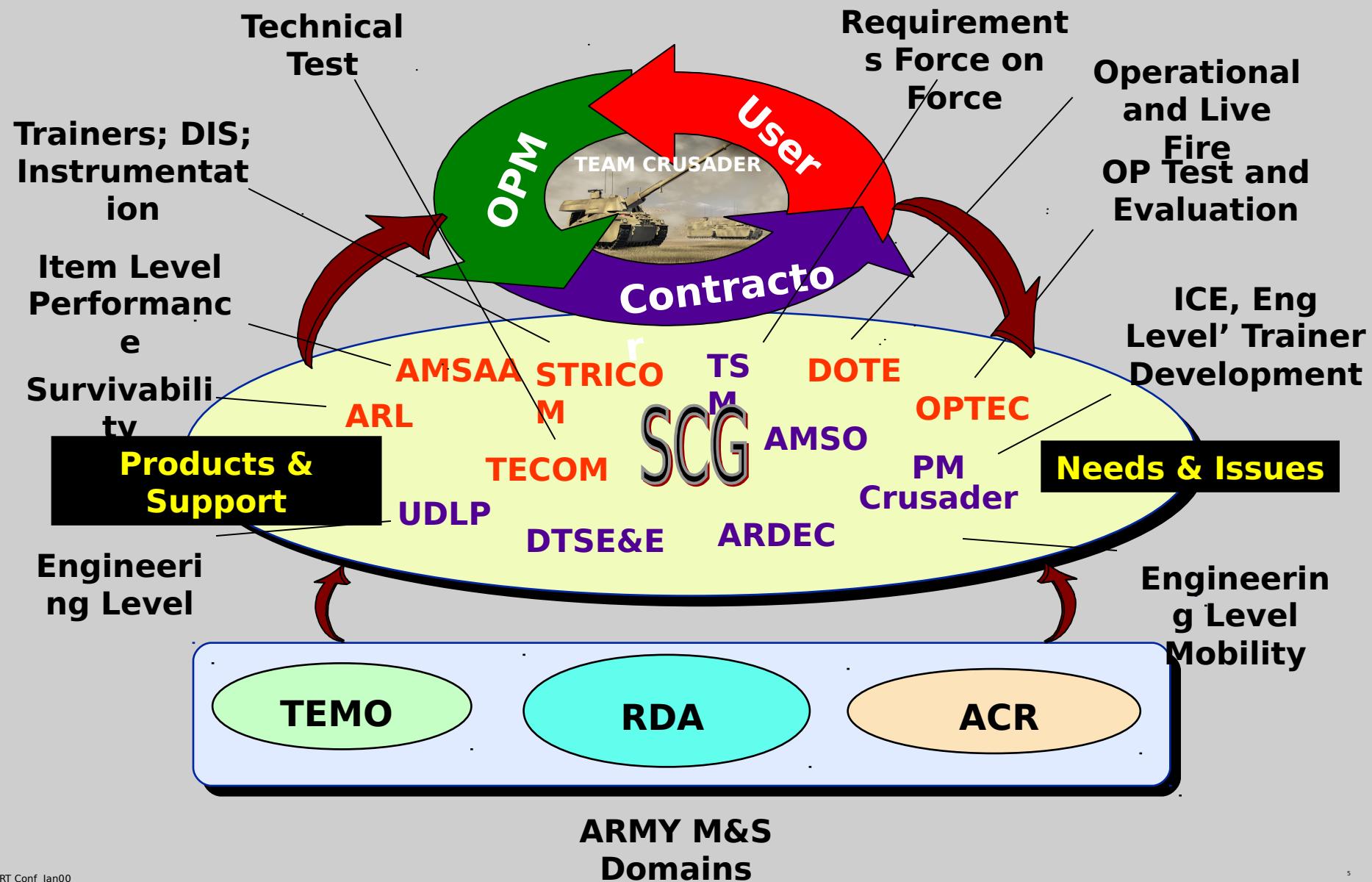


Main IDE Site

Lessons Learned

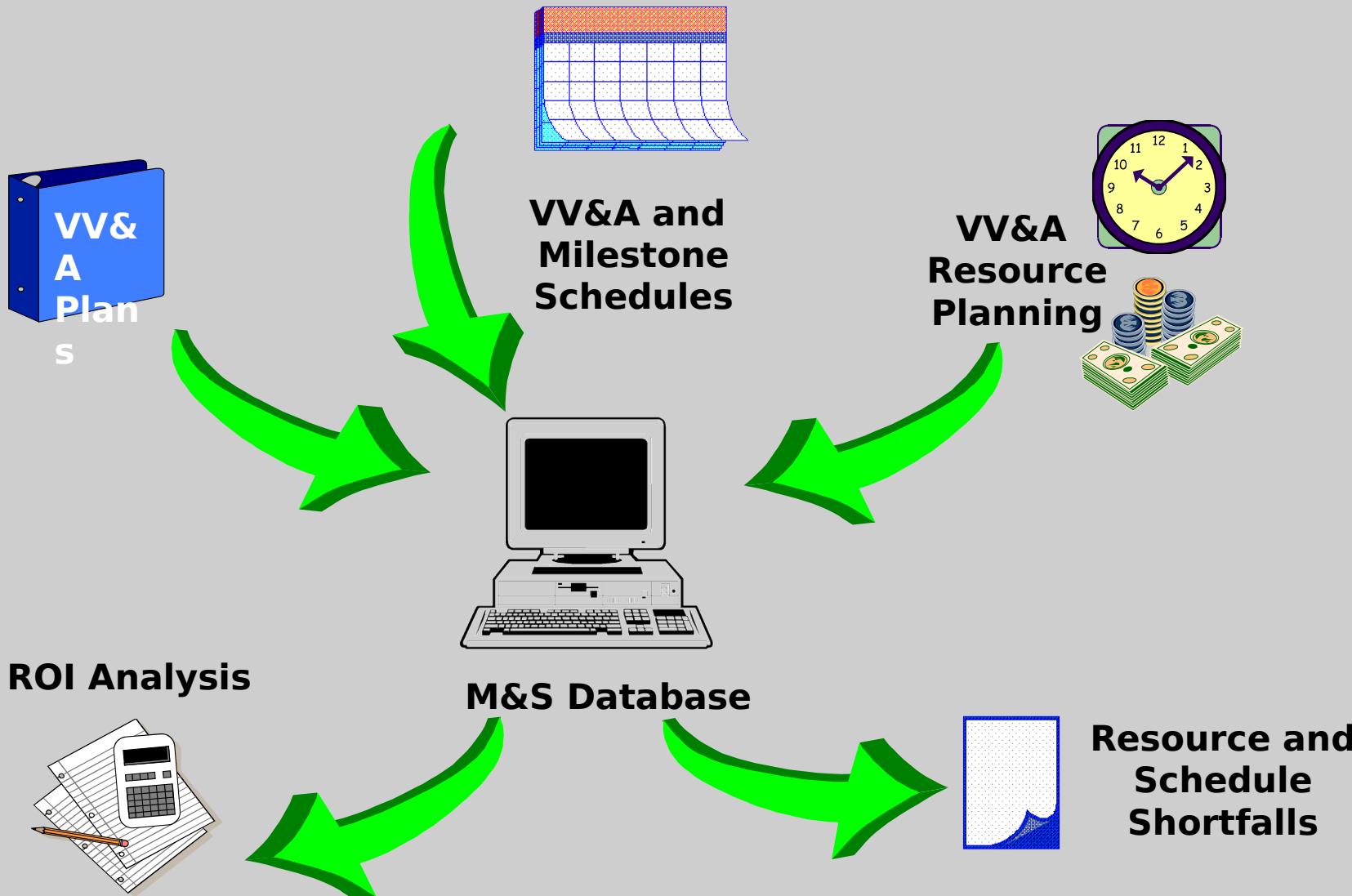
- ❖ Integrated Environment must have capacity to share entire master model
- ❖ Advanced tools require greater learning time and must be tailored to Program needs
- ❖ Engineering models provide data to CAIV process

Simulation Coordinating Group (SCG)





M&S Database



VV&A Decision Process

M&S Product / Tool

Requirement Verification

Is model addressing KPP, ORD, SC?

No

Does model feed standard Army model at item performance level which addresses KPP, ORD, SC?

Data Items / Output

Yes

VV&A

Yes

Is data available elsewhere?

No

VV&A

Crusader evolving process to determine which models will feed decisions:
Milestones
Independent Evaluations
AoA
Test Readiness Review

What level of V&V is required by model Use
History of Model
V&V History

Will the model be used more than once by Crusader?

Is cost of V&V justified by risk of decision (ROI)?

Who is accreditation authority and what level will they accept?



Yes

Is data from M&S domain?

Yes

Is M&S domain of applicability > domain of test information?

Yes

VV&A

Model
Test



T&E VV&A Candidates

150 Models Support Crusader :

Design

Requirements

Test & Eval

Force
Effectiveness

Training

Logistics

Production

Effectiveness

Sustainme
nt

Survivabilit
y

40 Models Support T&E
& 15 are Currently
Considered for VV&A.

FireSim

NRMM

VAM

CADAM

COMPASS

ARTREARM

MUVES

ORCA

PRISM

XPATCH

VSAT

MASH

ACQ-92

TASL

TRUCK

Force Effectiveness

- ❖ **Crusader Concept Experimentation Programs (CEP) I-III:**
 - Used M&S (FireSim XXI and JANUS)
 - Confirm TTPs and Operational Concepts for Crusader
- ❖ **A Number of Important Lessons Arose out of CEP I-III**
 - Crusader Rearm more effective with pooled RSVs
 - Survivability movements
 - AFATDS system improvements identified:
 - Platoon leaders wanted an additional screen to track ammo assets
 - MLRS Battalion played in CEP III
 - Optimization of Crusader and MLRS mission
 - SADARM was the preferred munition as being most lethal
 - Crusader-Comanche Sensor-to-Shooter
 - Expanded Battlespace
 - Enhanced Mobility Simultaneity and Precision Attacks

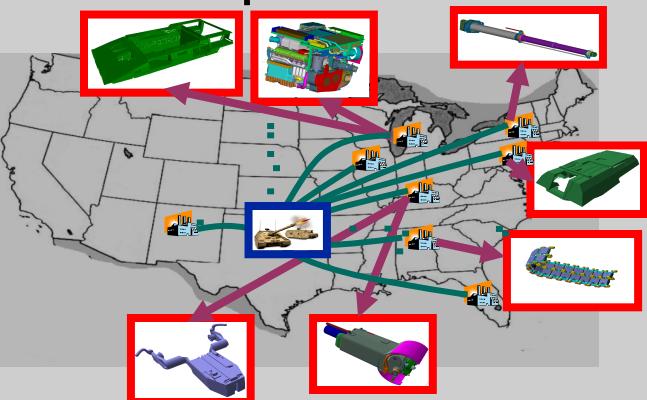


Modeling and Simulation Crusader Production Planning

Low Fidelity

High Fidelity

Enterprise Model



Model Outputs

- Cost model input
- Inventory costs
- Logistics plan

Lesson Learned: Production modeling has demonstrated a potential cost saving in using a removable glacis plate for crew compartment equipment installation

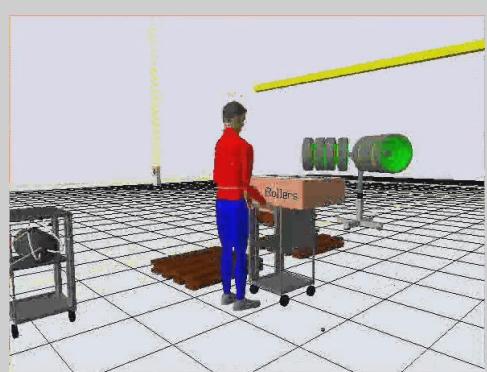
Factory Model



Model Outputs

- Factory layout
- Material flow
- Resource utilization
- Manpower requirements
- Thruput time
- Bottlenecks
- Line flexibility

Operational Model



Model Outputs

- Cell layout
- Process simulation
- Producibility
- Assembly work instructions
- Tooling/Fixture requirement
- Manpower requirements
- Ergonomics/Safety

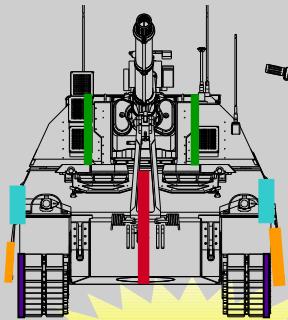


Refined Crusader





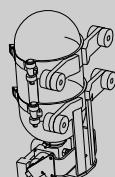
Weight Savings Summary Chart



Width
Saves 1-2 Tons

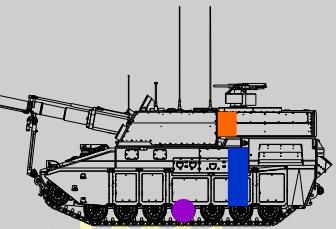


Gun Cradle

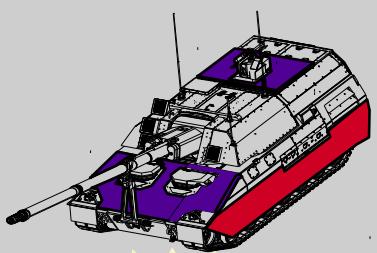


AFES Bottles

Material Changes
Saves 4 Tons



Length
Saves 1-1.5 Tons



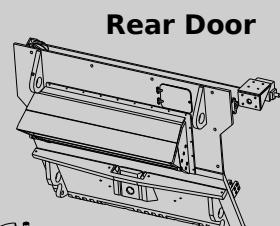
Protection by Kits
Saves 3 Tons



Power Package?

Suspension System

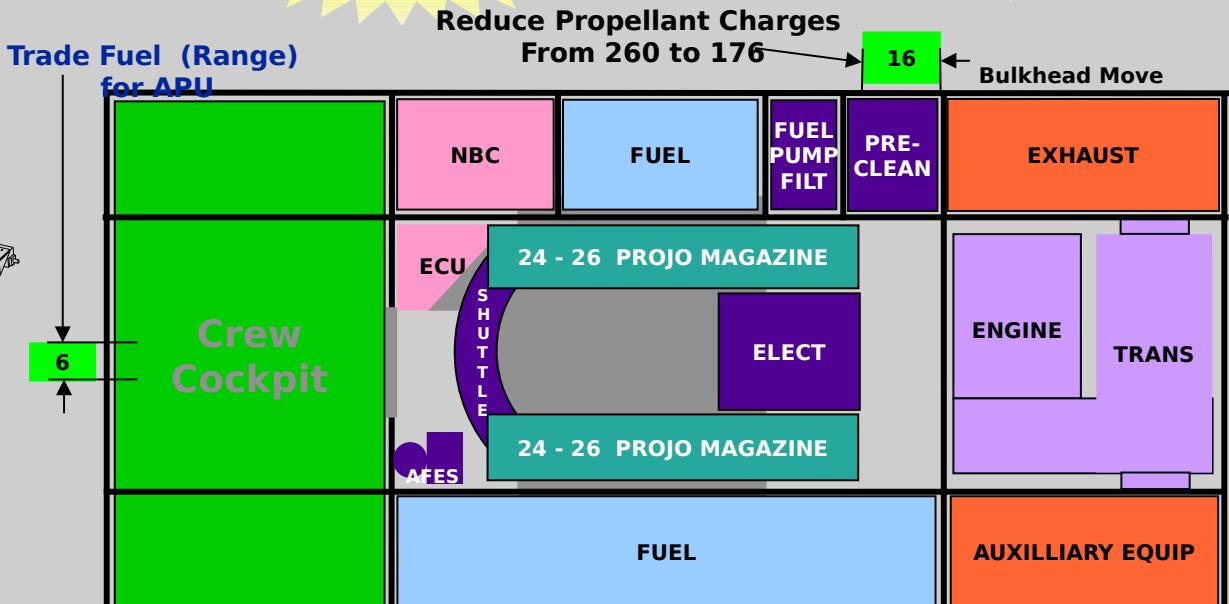
Mobility
Saves 5-6 Tons



Rear Door



Projectile Carrier



Payload
Saves 1 Ton



2 vs. 3 Man Crew Study

Timeline for the Model Runs:

- ❖ 29 Mar 00 - Reconcile 3-Crew IMPRINT Model with VIL
- ❖ 05 Apr 00 - Run 3 Crew-Model Excursions
- ❖ 14 Apr 00 - Convert 3-Crew IMPRINT Model to 2-Crew
- ❖ 21 Apr 00 - Run 2-Crew Model Excursions
- ❖ 12 May 00 - Refine Analysis & Summarize Results

IMPRINT

A network modeling tool designed to help assess the interaction of soldier and system performance. It incorporates task analysis, workload modeling, performance shaping and degradation functions and stressors, and embedded personnel characteristics data